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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

SUCHFIELD, GEORGE A

ART UNIT

PAPER NUMBER

3672

DATE MAILED: 07/09/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/841,000

Applicant(s)

ROUFFIGNAC ET AL.

Examiner

George Suchfield

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 June 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2193-2269, 5196 and 5197 is/are pending in the application.
- 4a) Of the above claim(s) 2196-2198, 2235-2237 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2193-2195, 2199-2234, 2238-2269, 5196 and 5197 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 2193-2269, 5196 and 5197 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5, 7, 9, 10.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

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1.

1. This application contains claims directed to the following patentably distinct species of the claimed invention:

A. Heating a hydrocarbon formation using an electrical heater(s). Claims 2196 and 2235 exemplify this species.

B. Heating a hydrocarbon formation using a surface burner(s). Claims 2197 and 2236 exemplify this species.

C. Heating a hydrocarbon formation using a flameless distributed combustor(s). Claims 2198 and 2237 exemplify this species.

D. Heating a hydrocarbon formation using a natural distributed combustor(s). Claims 2199 and 2238 exemplify this species.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, claims 2193-2195, 2200-2234 and 2239-2269 are generic.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after

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the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

2. During a telephone conversation with Eric B. Meyertons on April 5, 2002 a provisional election was made without traverse to prosecute the invention of Species D, claims 2199 and 2238. Affirmation of this election must be made by applicant in replying to this Office action. Claims 2196-2198 and 2235-2237 stand withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected species.

3. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a petition under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(I).

4. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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6. Claims 2208-2211, 2247-2250, 5396 and 5397 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 2208-2111 and 2247-2250 are indefinite because, insofar as a "hydrocarbon", by definition, comprises organic compounds consisting only of carbon and hydrogen, the recited "condensable hydrocarbons" cannot include nitrogen, oxygen, sulfur and/or oxygen-containing compounds. Claims 2208-2210, 2247-2249 appear further inaccurate with respect to the terms "nitrogen", "oxygen" and "sulfur", per se, because they are not even organic compounds, hydrocarbon or not. It appears that such terms/recitations should instead appear as, e.g., -- nitrogen compounds -- .

7. Conflicts exist between claims of the following related ninety-one co-pending applications which includes the present application:

09/840,936; 09/840,937; 09/841,000; 09/841,060; 09/841,061; 09/841,127; 09/841,128; 09/841,129; 09/841,130; 09/841,131; 09/841,170; 09/841,193; 09/841,194; 09/841,195; 09/841,238; 09/841,239; 09/841,240; 09/841,283; 09/841,284; 09/841,285; 09/841,286; 09/841,287; 09/841,288; 09/841,289; 09/841,290; 09/841,291; 09/841,292; 09/841,293; 09/841,294; 09/841,295; 09/841,296; 09/841,297; 09/841,298; 09/841,299; 09/841,300; 09/841,301; 09/841,302; 09/841,303; 09/841,304; 09/841,305; 09/841,306; 09/841,307; 09/841,308; 09/841,309; 09/841,310; 09/841,311; 09/841,312; 09/841,429; 09/841,430; 09/841,431; 09/841,432; 09/841,433; 09/841,434; 09/841,435; 09/841,436; 09/841,437; 09/841,438; 09/841,439; 09/841,440; 09/841,441; 09/841,442; 09/841,443; 09/841,444; 09/841,445; 09/841,446; 09/841,447; 09/841,448; 09/841,449; 09/841,488; 09/841,489; 09/841,490; 09/841,491; 09/841,492; 09/841,493; 09/841,494; 09/841,495; 09/841,496; 09/841,497; 09/841,498; 09/841,499; 09/841,500; 09/841,501; 09/841,502; 09/841,632; 09/841,633; 09/841,634; 09/841,635; 09/841,636; 09/841,637; 09/841,638; and 09/841,639.

37 CFR 1.78(b) provides that when two or more applications filed by the same applicant contain conflicting claims, elimination of such claims from all but one application may be required in the absence of good and sufficient reason for their retention during pendency in more

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than one application. The discussion below sets forth the Office's basis for its determination that each of these ninety-one applications contains at least one claim that conflicts with another one of the related co-pending applications identified above. Each of these ninety-one applications includes the same specification and collectively these applications present over five thousand claims. The Office has shown that each of these ninety-one applications contains at least one claim that conflicts with another one of the related co-pending applications identified above, and an analysis of each of five thousand+ claims in the ninety-one related co-pending applications would be an extreme burden on the Office requiring tens of thousands of claim comparisons. Therefore, the Office is requiring applicant to resolve the conflict between these applications and comply with 37 CFR 1.78(b) by either:

- (1) filing a terminal disclaimer in each of the related ninety-one applications terminally disclaiming each of the other twenty-eight applications; or,
- (2) provide a statement that all claims in the ninety-one applications have been reviewed by applicant and that no conflicting claims exist between the applications. Such a statement must set forth factual information identify how all the claims in the instant application are distinct and separate inventions from all the claims in the above identified ninety-one applications.

Applicant is reminded that obviousness-type double patenting analysis entails a two-step process: (1) the claims of this application and the other ninety-one applications must be construed; and (2) the claims of this application must be compared with the claims of the other applications to determine whether the differences in subject matter between the two claims render the claims patentably distinct. See Georgia-Pacific Corp. v. United States Gypsum Co., 195 F.3d 1322, 1326, 52 USPQ2d 1590, 1593 (Fed. Cir. 1999), and General Foods Corp. v. Studiengesellschaft Kohle, 972 F.2d 1272, 1279, 23 USPQ2d 1839, 1844 (Fed. Cir. 1992). As the Court of Customs and Patent Appeals (CCPA) explained: "[t]he fundamental reason for the rule [against "double patenting"] is to prevent unjustified timewise extension of the right to exclude granted by a patent no matter how the extension is brought about." In re Van Ornum, 686 F.2d 937, 943-44, 214 USPQ 761, 766 (CCPA 1982) (brackets and emphasis in the original) (quoting In re Schneller, 397 F.2d 350, 354, 158 USPQ 210, 214 (CCPA 1968)). Furthermore, the requirement will be held in abeyance until such time as the examiner indicates allowable subject matter. Examples of conflicts appear in the rejections here-in-below.

8. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See In re Goodman, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); In re Longi, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); In re Van Ornum, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); In re Vogel, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, In re Thorington, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

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A timely filed terminal disclaimer in compliance with 37 CFR 1.321© may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

9. Claims 2193-2269, 5396 and 5397 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over copending applications (including the present application):

09/840,936; 09/840,937; 09/841,000; 09/841,060; 09/841,061; 09/841,127; 09/841,128; 09/841,129; 09/841,130; 09/841,131; 09/841,170; 09/841,193; 09/841,194; 09/841,195; 09/841,238; 09/841,239; 09/841,240; 09/841,283; 09/841,284; 09/841,285; 09/841,286; 09/841,287; 09/841,288; 09/841,289; 09/841,290; 09/841,291; 09/841,292; 09/841,293; 09/841,294; 09/841,295; 09/841,296; 09/841,297; 09/841,298; 09/841,299; 09/841,300; 09/841,301; 09/841,302; 09/841,303; 09/841,304; 09/841,305; 09/841,306; 09/841,307; 09/841,308; 09/841,309; 09/841,310; 09/841,311; 09/841,312; 09/841,429; 09/841,430; 09/841,431; 09/841,432; 09/841,433; 09/841,434; 09/841,435; 09/841,436; 09/841,437; 09/841,438; 09/841,439; 09/841,440; 09/841,441; 09/841,442; 09/841,443; 09/841,444; 09/841,445; 09/841,446; 09/841,447; 09/841,448; 09/841,449; 09/841,488; 09/841,489; 09/841,490; 09/841,491; 09/841,492; 09/841,493; 09/841,494; 09/841,495; 09/841,496; 09/841,497; 09/841,498; 09/841,499; 09/841,500; 09/841,501; 09/841,502; 09/841,632; 09/841,633; 09/841,634; 09/841,635; 09/841,636; 09/841,637; 09/841,638; and 09/841,639.

Although the conflicting claims are not identical, they are not patentably distinct from other. For example; claim 564, currently pending in S.N. 09/841,437 is an obvious variation of claim 2200 pending herein, and claim 565 currently pending in 09/841,437 is an obvious variation of claim 2239 pending herein. More specifically, both claim 564 and 2200 call for heating a section of a formation to increase the permeability to greater than about 100 millidarcy while controlling the pressure as a function of temperature, or controlling the temperature as a function of pressure; the precise extent of formation heated, i.e., a majority of the section or a

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majority of a portion of the section is deemed a matter of choice or design based on, e.g., formation characteristics or economic feasibility. Similarly, both claim 565 and 2239 call for heating a section of a formation to increase the permeability substantially uniformly while controlling the pressure as a function of temperature, or controlling the temperature as a function of pressure; the precise extent of formation heated, i.e., a majority of the section or a majority of a portion of the section is deemed a matter of choice or design based on, e.g., formation characteristics or economic feasibility.

It is further noted that claims 2193-2269, 5396 and 5397 are specifically not patentably distinct from claims 2193-2269 of applicant's copending application 09/841,284 because the hydrocarbon containing formation treated by the method of, e.g., claim 2193 or 5081 of this pending application is deemed broad enough to encompass the coal formation of claim 2193 or 5317 of the copending application. Otherwise, the remaining claims of both this and the copending application appear to correspond, with the additional limitation in claims 5396 and 5397 to 20 heat sources per recovery well deemed an obvious matter of choice or design based on, e.g., the characteristics, properties and/or areal extent of particular hydrocarbon formation encountered in the field.

See MPEP 804.02 IV for a discussion of multiple double patenting rejections and the requirements for a single terminal disclaimer.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 2193, 2195, 2205-2218, 2226, 2227, 2230-2232, 2234, 2244-2257, 2268, 2269, are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Camacho et al (4,067,390).

Camacho et al (col. 7, line 32 – col. 8, line 57) discloses a process for heating a hydrocarbon formation, which may comprise an oil shale, tar sands or coal formation wherein the heat imparted causes devolatilization and “cracking or fracturing” of the coal, e.g., as illustrated by zone (40,40') of Figures 4 and 5. Such heating effect on the hydrocarbon formation is deemed to necessarily or obviously increase the permeability, as called for in claims

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2193, 2232, 5081 and 5175. It is further deemed that such permeability increase will inherently or obviously be substantially uniform, as called for in claims 2232, 2227, 5196 as illustrated in Figures 4 and 5. Such permeability increase is deemed to necessarily or inherently encompass an increase to "greater than about 100 millidarcy" or "greater than about 5 Darcy", as called for in claims 2193, 2226, 5175; alternatively, to increase the permeability to greater than 100 millidarcy or 5 Darcy would have been an obvious matter of choice in order to ensure adequate fluid flow through the formation. The plasma arc torch (25) is deemed to comprise the "heat source" of these claims; it is further deemed an electrical heater as called for in claim 5085. Camacho et al further encompasses the process steps of claim 5087-5090, such as monitoring the composition of the produced mixture (note Figure 9; col. 9, lines 1-18, 56-69). In this regard, it is further deemed that subsequent steps in response to such monitoring as adjusting the steam flow rate and torch power, will also inherently or obviously control the pressure in the coal formation, e.g., by the resulting varying volatilization or gasification of the hydrocarbon constituents or moisture evaporation rate.

Pyrolysis clearly occurs in the said formation, as called for in claims 2195, 2234 and 5177.

Regarding claims 2205-2218, 2244-2257, 5175 and 5182-5192, it is deemed that the myriad hydrocarbon product mixtures recited in these claims would necessarily or obviously occur in carrying out the heating process of Camacho et al, i.e., the precise composition of the product fluids is seen as dictated by the type of hydrocarbon naturally occurring in the particular hydrocarbon formation actually encountered in the field. Moreover, it would be an obvious matter of choice to operate the Camacho et al process to minimize what would be considered

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refinery contaminants, such as sulfur, nitrogen and/or oxygen in the product mixtures.

Similarly, it would be obvious to reduce or minimize the amount of asphaltenes in the product mixtures for optimum downstream refining. Also, in the event that the particular hydrocarbon deposit encountered yields ammonia gas, it would be an obvious expedient to utilize it in a commercial process such as fertilizer production.

Regarding claims 2230, 2231, 5087 Camacho et al (note Figure 8 and col. 9, lines 20-50) clearly discloses that the plasma arc torch heat sources (25) may be provided in a repeating triangular pattern.

13. Claims 2201-2204, 2219-2222, 2228-2231, 2240-2243, 2258-2261, 2266-2269, 5396 and 5397 are rejected under 35 U.S.C. 103(a) as being unpatentable over Camacho et al (4,067,390).

The precise heating rate and thermal conductivity recited in claims 2201, 2202, 2240, 2241 are deemed obvious matters of choice or design based on, e.g., the quality and amount of the in place hydrocarbon present in the particular hydrocarbon formation encountered in the field, consistent with objective of Camacho et al to provide a low rate of heating (col. 10, lines 34-40).

Insofar as a coal formation (11) may be of low initial permeability and/or porosity, it is deemed that at least some transfer of heat by conduction from the point(s) of combustion will necessarily or obviously occur during the Camacho et al process, as called for in claim 2203, 2242, 5155, 5180.

The thermal conductivity recited in claim 2204, 2243 is deemed an obvious matter of choice or design based on, e.g., the quality and type of the hydrocarbon formation present and/or the matrix characteristics of the particular hydrocarbon formation encountered in the field.

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The steps of 2219-2222, 2228, 2258-2261, 2266 such as controlling the heat or pressure in the formation, are deemed obvious matters of choice or design in carrying out the process of Camacho et al. In this regard, Camacho et al teaches that steam injection temperature, pressure and/or volume may be controlled in response to monitoring of the fluid products. In addition, overall operating conditions within the hydrocarbon formation may be altered (noted col. 5, lines 20-27) to vary the product fluid composition(s).

Regarding claims 2229-2231, 2267-2269, 5396, 5397, Camacho et al in the embodiment of Figure 10 discloses that myriad heating wells (65) may surround a production well or shaft (74). The precise number of such heating wells provided, as called for in these claims, is deemed an obvious matter of choice or design in carrying out the process of Camacho et al based on, e.g., the overall areal extent of the hydrocarbon formation(s) encountered in exploiting an actual reservoir encountered in the field.

14. Claims 2225 and 2264 are rejected under 35 U.S.C. 103(a) as being unpatentable over Camacho et al (4,067,390) as applied to claim 2270 above, and further in view of Hoekstra et al (4,353,418) or Garrett (3,661,423).

It would have been obvious to one of ordinary skill in the art to which the invention pertains to hydrogenate the hydrocarbons produced from the heating process of Camacho et al, which hydrocarbons may be in liquid and/or vaporous form, with hydrogen also produced by the heating process of Camacho et al (col. 2, line 44-49), as taught by Hoekstra et al (note the Abstract and figure) or Garrett (col. 4, lines 50-54), in order to simultaneously provide an exemplary "non-energy use" for hydrogen produced by Camacho et al and improve the overall quality of the liquid and/or condensable hydrocarbon fluids produced by Camacho et al.

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15. Claims 2193, 2195, 2200, 2205-2218, 2226, 2227, 2232, 2234, 2244-2257 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Justheim (3,766,982).

Justheim'982 discloses the heating of a subterranean solid "hydrocarbonaceous" formation, which may comprise oil shale, bituminous sands, or coal, wherein such heating increases the permeability of the coal formation (note col. 4, lines 15-20). It is deemed that such permeability increase will inherently or obviously be substantially "uniform", as called for in claims 2232, 2227 and 5196, e.g., since the injected heated air which causes the permeability increase permeates throughout the hydrocarbonaceous formation. Also, such permeability increase is deemed to necessarily or inherently encompass an increase to "greater than about 100 millidarcy" or "greater than about 5 Darcy", as called for in claims 2193, 2226; alternatively, to increase the permeability to greater than 100 millidarcy or 5 Darcy would have been an obvious matter of choice in order to ensure adequate fluid flow through the formation. The hot air itself is deemed to comprise a "heat source", as called for in these claims.

Pyrolysis clearly occurs in the said formation, as called for in claims 2195 and 2234 .

As per claim 2200, while in situ or "natural" combustion is not explicitly set forth in Justheim, it is deemed that the injection of heated air, especially at a temperature of 2000oF, will necessarily or obviously ignite the hydrocarbonaceous formation, e.g., upon contact with any in-place methane or volatile hydrocarbon(s) present, and effect such in situ combustion and thus comprise a "natural distributed combustor", as broadly recited.

Regarding claims 2205-2218, 2244-2257, it is deemed that the myriad hydrocarbon product mixtures recited in these claims would necessarily or obviously occur in carrying out the

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heating process of Justheim, i.e., the precise composition of the product fluids is seen as dictated by the type of coal naturally occurring in the particular hydrocarbonaceous formation actually encountered in the field. Moreover, it would be an obvious matter of choice to operate the Camacho et al process to minimize what would be considered refinery contaminants, such as sulfur, nitrogen and/or oxygen in the product mixtures. Similarly, it would be obvious to reduce or minimize the amount of asphaltenes in the product mixtures for optimum downstream refining. Also, in the event that the particular hydrocarbonaceous deposit encountered yields ammonia gas, it would be an obvious expedient to utilize it in a commercial process such as fertilizer production.

16. Claims 2201-2204, 2219-2224, 2228, 2240-2243, 2258-2263, and 2266 are rejected under 35 U.S.C. 103(a) as being unpatentable over Justheim (3,766,982).

The precise heating rate and thermal conductivity recited in claims 2201, 2202, 2240, 2241, 5154, 5179, are deemed obvious matters of choice or design based on, e.g., the quality and amount of the in place hydrocarbon present in the particular hydrocarbonaceous formation encountered in the field in carrying out the process of Justheim.

Insofar as the hydrocarbonaceous formation (11) may be of low initial permeability and/or porosity, it is deemed that at least some transfer of heat by conduction from the point(s) of combustion will necessarily or obviously occur during the Justheim process, as called for in claims 2203, 2242.

The thermal conductivity recited in claim 2204, 2243, is deemed an obvious matter of choice or design based on, e.g., the quality and type of the hydrocarbonaceous formation present

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and/or the matrix characteristics of the particular hydrocarbonaceous formation encountered in the field.

As per claim 2220, Justheim specifically calls for injection of hydrogen into the hydrocarbonaceous formation to effect hydrogenation of the volatilized/pyrolyzed hydrocarbons evolved, thus the production fluids actually produced will necessarily or obviously include a partial pressure of hydrogen, with the precise amount thereof deemed an obvious matter of choice or design, based on, e.g., the particular hydrocarbonaceous formation encountered.

As per claim 2221, 2260, insofar as Justheim strives to control the amount of hydrogen present throughout the process to minimize “danger of accidental explosions”, it would have been an obvious expedient or matter of choice to monitor the partial pressure of hydrogen at the production well(s) using conventional or commercially-available monitoring means.

The steps of 2219, 2222, 2228, 2258, 2261, 2266 such as controlling the heat or pressure in the formation, are deemed obvious matters of choice or design in carrying out the process of Justheim.

As per claim 2223, 2224, 2262, 2263, Justheim injects hydrogen into the heated hydrocarbonaceous formation to hydrogenate the volatilized/pyrolyzed hydrocarbons evolved; and the hydrogen provided may further be obtained from production fluids obtained from the hydrocarbonaceous formation (col. 3, lines 1-9).

17. Claims 2225 and 2264 are rejected under 35 U.S.C. 103(a) as being unpatentable over Justheim (3,766,982) as applied to claim 2193 above, and further in view of Hoekstra et al (4,353,418) or Garrett (3,661,423).

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It would have been obvious to one of ordinary skill in the art to which the invention pertains to further hydrogenate the partially-hydrogenated hydrocarbons produced from the heating process of Justheim, with hydrogen circulated or produced by the heating process of Justheim, as taught by Hoekstra et al (note the Abstract and figure) or Garrett (col. 4, lines 50-54), in order to improve the overall quality of the liquid and/or condensable hydrocarbon fluids produced by Justheim by fully or completing hydroconverting/hydrogenating refinement process.

18. Claims 2230, 2231, 2268, 2269 are rejected under 35 U.S.C. 103(a) as being unpatentable over Justheim (3,766,982) as applied to claim 2193 above, and further in view of Salomonsson (2,914,309) or Camacho et al (4,067,390).

It would have been obvious to one of ordinary skill in the art to which the invention pertains to carry out the multiple well heating embodiment of Justheim (col. 2, lines 30-55) by providing or laying out the wells in a triangle, and/or repeating triangle pattern, as disclosed by Salomonsson (note Figure 3 and col. 3, lines 5-34) or Camacho et al (note Figure 8) in order to enhance the overall heating/pyrolysis effected by optimizing well location.

19. Claims 2193-2195, 2199, 2200, 2203, 2205-2215, 2217, 2218, 2226, 2227, 2232-2234, 2238, 2239, 2242, 2244-2254, 2256, 2257, 2265 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ljungstrom (2,923,535).

Ljungstrom discloses a process for heating a hydrocarbon formation, which may comprise oil shale or coal, wherein the heat imparted causes volatilization, pyrolysis and gasification of hydrocarbon constituents, as well as causing an increase in permeability of such

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hydrocarbon formation (note col. 2, lines 1-24), as called for in claim 5081. It is further deemed that such permeability increase will inherently or obviously be substantially uniform, as called for in claims 2232, 2227, e.g. during an overall field heating process, as illustrated in Figures 2-5. Such permeability increase is deemed to necessarily or inherently encompass an increase to “greater than about 100 millidarcy” or “greater than about 5 Darcy”, as called for in claims 2193, 2226, 2265; alternatively, to increase the permeability to greater than 100 millidarcy or 5 Darcy would have been an obvious matter of choice in order to ensure adequate fluid flow through the formation.

As per claim 2194, 2233, in view of the large number of heat input wellbores or “sources”, relative to a recovery wellbore (26), as illustrated in Figures 2-5 and 9, it is deemed at least some overlap or “superposition” of the heat applied will necessarily or obviously occur, especially in ensuring that the entire coal formation extent is heated – which appears necessary in order to provide the “exhaust channels” (40,42) in the coal or oil shale seam (col. 3, line 48 – col. 4, line 9)

As noted above, pyrolysis clearly occurs in the hydrocarbon formation, as called for in claims 2195, 2234.

As per claims 2199, 2238 the process of Ljungstrom also calls for heating by in situ combustion after an electrical heating phase; such wellbore(s), then, through which in situ combustion is initiated and/or sustained is deemed to necessarily or obviously comprise a “natural distributed combustor”, as broadly recited.

As per claims 2200, 2239, Ljungstrom specifically discloses that the temperature “may be controlled depending on ... the pressure maintained or permitted to build up” (col. 2, lines 41-

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45). In addition, the temperature and pressure curves of Figures 10 and 11 appear to indicate a direct relationship between temperature and pressure within the coal formation.

As per claim 2203, 2242, 5180, at least a portion of the heating effected in Ljungstrom is effected "substantially by conduction", e.g., in the widening of the porous coal or oil shale layer (30) (see col. 3, lines 29-36).

Regarding claims 2205-2215, 2217, 2218, 2244-2254, 2256, 2257, it is deemed that the myriad hydrocarbon product mixtures recited in these claims would necessarily or obviously occur in carrying out the heating process of Ljungstrom, i.e., the precise composition of the product fluids is seen as dictated by the type of coal naturally occurring in the particular coal or oil shale formation actually encountered in the field. Moreover, it would be an obvious matter of choice to operate the Ljungstrom process to minimize what would be considered refinery contaminants, such as sulfur, nitrogen and/or oxygen in the product mixtures. Similarly, it would be obvious to reduce or minimize the amount of asphaltenes in the product mixtures for optimum downstream refining. Also, in the event that the particular coal or oil shale deposit encountered yields ammonia gas, it would be an obvious expedient to utilize it in a commercial process such as fertilizer production.

20. Claims 2201, 2202, 2204, 2219, 2222, 2228, 2229, 2240, 2241, 2243, 2258, 2261, 2266, 2267, 5396 and 5397 179 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ljungstrom (2,923,535).

The precise heating rate and/or thermal conductivity recited in claims 2201, 2202, 2240, 2241, are deemed obvious matters of choice or design, especially in carrying out the embodiment

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in Ljungstrom of controlling and/or maintaining the temperature in the hydrocarbon formation within a specific operating range (col. 2, lines 25-48)

The thermal conductivity recited in claim 2204, 2243, 5181 is deemed an obvious matter of choice or design based on, e.g., the quality and type of the coal or oil shale formation present and/or the matrix characteristics of the particular coal or oil shale formation encountered in the field.

The steps of 2219, 2222, 2228, 2258, 2261, 2266, such as controlling the heat or pressure in the formation, are deemed obvious matters of choice or design in carrying out the process of Ljungstrom, consistent with one of the overall objectives of Lungstrom to control the heating process (col. 2, lines 25-55).

Regarding claims 2229, 2267, 5396 and 5397, Ljungstrom in the embodiment of Figures 2-5 and 9, discloses that myriad heating wellbores (20) may surround a production wellbore or shaft (26). The precise number of such heating wells provided, as called for in these claims, is deemed an obvious matter of choice or design in carrying out the process of Ljungstrom based on, e.g., the overall areal extent of the coal or oil shale formation(s) encountered in exploiting an actual reservoir encountered in the field.

21. Claims 2216, 2220, 2221, 2255, 2259, 2260, are rejected under 35 U.S.C. 103(a) as being unpatentable over Ljungstrom (2,923,535) as applied to claim 2193 above, and further in view of Tsai et al (4,299,285).

While Ljungstrom does not disclose the presence of hydrogen in a coal or oil shale heating production effluent, Tsai et al (col. 5, line 52 – col. 6, line 15) clearly discloses that

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gasification/volatilization products resulting from heating and/or gasifying a coal formation include hydrogen.

Accordingly, it is deemed that the volatilized/gasified coal production effluent produced in the process of Ljungstrom will obviously include a hydrogen component, as taught by Tsai et al, with the precise amount of hydrogen present, as called for in claims 2216, 2220, 2255, 2259, 5150, 5191, 5194, deemed an obvious expedient or matter of choice to one of ordinary skill in the art to which the invention pertains, based on, e.g., the actual intended use of the production effluent, such as a feed stream to a synthetic natural gas production facility or as process heat gas, as called for in claims.

As per claim 2221, 2260, it would have further been an obvious expedient or matter of choice to monitor the production effluent of Ljungstrom for hydrogen content, especially since Ljungstrom makes specific reference to controlling the process based on, inter alia, "the products desired" (col. 2, lines 42-44).

22. Claims 2216, 2220, 2221, 2223, 2224, 2256, 2259, 2260, 2262, 2263 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ljungstrom (2,923,535) as applied to claim 2193 above, and further in view of Justheim (3,766,982) (applied above).

Justheim'982 injects hydrogen into the heated hydrocarbon formation to hydrogenate the volatilized/pyrolyzed hydrocarbons evolved; and the hydrogen provided may further be obtained from production fluids obtained from the formation (col. 3, lines 1-9).

Accordingly, it would have been obvious to one of ordinary skill in the art to which the invention pertains, to similarly inject hydrogen into the heated coal or oil shale formation in the process of Ljungstrom, e.g., in the vicinity of the recovery wellbores, and provide the hydrogen

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from the production effluent, as taught by Justheim, in order to effect a partial hydroconversion/hydrotreating of the volatilized, pyrolyzed and/or gasified hydrocarbons prior to production in order to render the production effluent more suitable for further refining or above-ground processing/conversion, as called for in claims 2223, 2224, 2262, 2263.

As per claims 2216, 2220, 2256, 2259, in carrying out the injection of hydrogen into the coal formation to effect hydrogenation of the volatilized/pyrolyzed hydrocarbons evolved, in the modified process of Ljungstrom, the production fluids actually produced will necessarily or obviously include a partial pressure of hydrogen, with the precise amount thereof deemed an obvious matter of choice or design, based on, e.g., the particular coal or oil shale formation encountered.

As per claim 2221, 2260, insofar as Justheim strives to control the amount of hydrogen present throughout the process to minimize “danger of accidental explosions”, it would have been an obvious expedient or matter of choice to monitor the partial pressure of hydrogen at the production well(s) using conventional or commercially-available monitoring means, in carrying out the overall process of Ljungstrom, as modified by Justheim.

23. Claims 2225, 2264 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ljungstrom (2,923,535) in view of Justheim (3,766,982) as applied to claim 2223 above, and further in view of Hoekstra et al (4,353,418) or Garrett (3,661,423).

It would have been obvious to one of ordinary skill in the art to which the invention pertains to further hydrogenate the partially-hydrogenated hydrocarbons produced from the heating process of Ljungstrom, as modified by Justheim '982, with hydrogen circulated or produced by the heating process of Justheim, as taught by Hoekstra et al (note the Abstract and

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figure) or Garrett (col. 4, lines 50-54), in order to improve the overall quality or advance the refining/processing of the volatilized, pyrolyzed and/or gasified hydrocarbon fluids produced by the process of Ljungstrom, as modified by Justheim'982, by fully completing hydroconverting/hydrogenating refinement process.

24. Claims 2230, 2231, 2268, 2269 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ljungstrom (2,923,535) as applied to claim 2193 above, and further in view of Salomonsson (2,914,309) or Camacho et al (4,067,390).

It would have been obvious to one of ordinary skill in the art to which the invention pertains to carry out the multiple well heating embodiment of Ljungstrom (Figures 2-5 and 9) by providing or laying out the wells in a triangle, and/or repeating triangle pattern, as disclosed by Salomonsson (note Figure 3 and col. 3, lines 5-34) or Camacho et al (note Figure 8) in order to enhance the overall heating/pyrolysis effected by optimizing well location.

25. Claims 2193-2195, 2200-2203, 2205-2220, 2226, 2228, 2230-2234, 2239-2242, 2244-2259, 2266, 2268, 2269 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Pelofsky (3,882,941).

Pelofsky discloses heating an oil shale formation wherein over the course of heat injection, shut-in and production cycles, the oil shale formation will experience "a marked increase in permeability" (col. 2, lines 39-68). It is deemed that such permeability increase will inherently or obviously be substantially uniform, as called for in claims 2232 or 2227, insofar as the entire oil shale formation extent appears affected by the heating and shut-in cycles. Such permeability increase, i.e., the precise degree or amount of permeability increase effected, such as 100 millidarcy or 5 Darcy, as called for in claims 2193, 2226 or 2265, is deemed to inherently

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or obviously occur in the process of Pelofsky based on or dictated by, e.g., the characteristics, such as kerogen content, of the oil shale actually encountered in the field.

As per claims 2194, 2233, Figure 2 and col. 4, lines 21-50; col. 5, line 58 - col. 6, line 14 are particularly relied upon wherein overlapping or superimposed heat is provided to an oil shale deposit in order to increase the heating effect thereby enhancing the pyrolysis of the oil shale to kerogen.

As per claims 2195 and 2234, Pelofsky clearly maintains the temperature in a pyrolysis range, i.e., sufficient to convert the kerogen into bitumen.

As per claims 2200 and 2239 it is noted that Pelofsky controls the pressure or temperature during the cyclic phases of the heating process, i.e., the hot fluids injection and shut-in are based on pressure measurements and control in early cycles, followed by temperature measurements and control in later cycles. It is deemed that the pressure and temperature within the oil shale deposit are each inherently or obviously related and controlled relative to the other during the Pelofsky process (note col. 3, lines 9-67) since the temperature input or increase to the deposit is limited by the pressure buildup, and the eventual effect of the temperature increase is to render the deposit more permeable thus effecting the operating pressure within.

The process steps of claims 2201, 2202, 2240, 2241, are deemed inherently or obviously carried out by Pelofsky which, by virtue of carrying out the heating in stages, i.e., injection, then shutting-in the well, necessarily or obviously provides a relatively slow rate of heating.

Regarding claims 2203 and 2242, insofar as Pelofsky observes that the oil shale deposit possesses an initial permeability of "usually essentially zero" (col. 2, lines 47-50), it is deemed

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that at least some phase of the overall oil shale heating will inherently or obviously be "substantially by conduction".

Regarding claims 2205-2218, 2220, 2228, 2244-2257, 2259, 2266 it is deemed that the myriad hydrocarbon product mixtures recited in these claims would necessarily or obviously occur in carrying out the in situ retorting process of Pelofsky, i.e., the precise composition of the product fluids is seen as dictated by the particular kerogen naturally occurring in the particular oil shale formation actually encountered in the field. Moreover, it would be an obvious matter of choice to operate the Pelofsky process to minimize what would be considered refinery contaminants, such as sulfur, nitrogen and/or oxygen in the product mixtures. Similarly, it would be obvious to reduce or minimize the amount of asphaltenes in the product mixtures for optimum downstream refining. Also, in the event that the particular oil shale deposit encountered yields ammonia gas, it would be an obvious expedient to utilize in a commercial process such as fertilizer production.

As per claims 2219 and 2258, insofar as Pelofsky operates the process by controlling pressure around 50 psi above formation or deposit pressure, it inherently or obviously controls the pressure at least 2.0 bar.

As per claims 2230, 2231, 2268, 2269, the well pattern illustrated in Figure 2 of Pelofsky clearly comprise three or more heat sources and could be construed as comprising a "triangular" pattern, as broadly recited in these claims.

26. Claims 2204, 2243 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pelofsky (3,882,941)

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The thermal conductivity recited in claims 2204 and 2243 is deemed an obvious matter of choice or design based on, e.g., the quality and amount of the kerogen present and/or the matrix characteristics of the particular oil shale formation encountered in the field.

27. Claims 2230, 2231, 2268 and 2269 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pelofsky (3,882,941) as applied to claim 412 and 452 above, and further in view of Salomonsson (2,914,309).

It would have been obvious to one of ordinary skill in the art to which the invention pertains to carry out the multiple well heating embodiment of Pelofsky (as per Figure 2) by providing or laying out the wells in a triangle, and/or repeating triangle pattern, as disclosed by Salomonsson (note Figure 3 and col. 3, lines 5-34) in order to enhance the overall heating/pyrolysis effected by optimizing well location.

28. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

It is noted that the reference to Bridges et al (4,144,935) also heats a subterranean hydrocarbon formation to effect hydrocarbon fluids production, which heating also fractures or increases the formation permeability (note col. 17, lines 15-45). Thus, it is deemed cumulative to the references applied above against one or more of the claims, such as 2193 or 2232.

It is noted that the reference to Albaugh (2,685,930) also heats a subterranean petroleum formation to effect hydrocarbon fluids production, which heating also fractures or increases the formation permeability (note col. 2, lines 7-35). Thus, it is deemed cumulative to the references applied above against one or more of the claims, such as 2193 or 2232.

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It is noted that the reference to Van Meurs et al (4,886,118) also heats a subterranean oil shale formation to effect hydrocarbon fluids production, which heating also fractures or increases the formation permeability (note col. 8, lines 15-39; col. 16, lines 38-50; col. 15, lines 32- 43). Thus, it is deemed cumulative to the references applied above against one or more of the claims, such as 2193 or 2232.

It is noted that the reference to Sresty (4,485,869) also heats a subterranean oil shale formation to effect hydrocarbon fluids production, which heating also fractures or increases the formation permeability (note col. 3, line 52 – col. 4, line 22; col. 9, lines 23-58). Thus, it too is deemed cumulative to the references applied above against one or more of the claims, such as 2193 or 2232.

It is noted that the reference to Herzog (2,906,340) also heats a subterranean petroleum formation to effect hydrocarbon fluids production, which heating also thermally fractures or increases the formation permeability (note col. 3, lines 28 – 62). Thus, it too is deemed cumulative to the references applied above against one or more of the claims, such as 2193 or 2232.

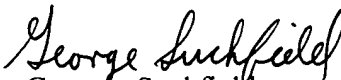
Any inquiry concerning this communication or earlier communications from the examiner should be directed to George Suchfield whose telephone number is 703-308-2152. The examiner can normally be reached on M-F (6:30 - 3:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Bagnell can be reached on 703-308-2151. The fax phone numbers for the

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organization where this application or proceeding is assigned are 703-305-7697 for regular communications and 703-305-7697 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1113.


George Suchfield
Primary Examiner
Art Unit 3672

gs
July 8, 2002